

A NEW SPECIES OF *PULICELLA* FROM TANZANIA WITH COMMENTS ON THE GENUS (SIPHONAPTERA: PULICIDAE)

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Abstract.—A new species of *Pulicella* collected on *Otomys angoniensis* in the Ngorongoro Crater of Tanzania is described. Its affinities with the only other species in the genus are discussed.

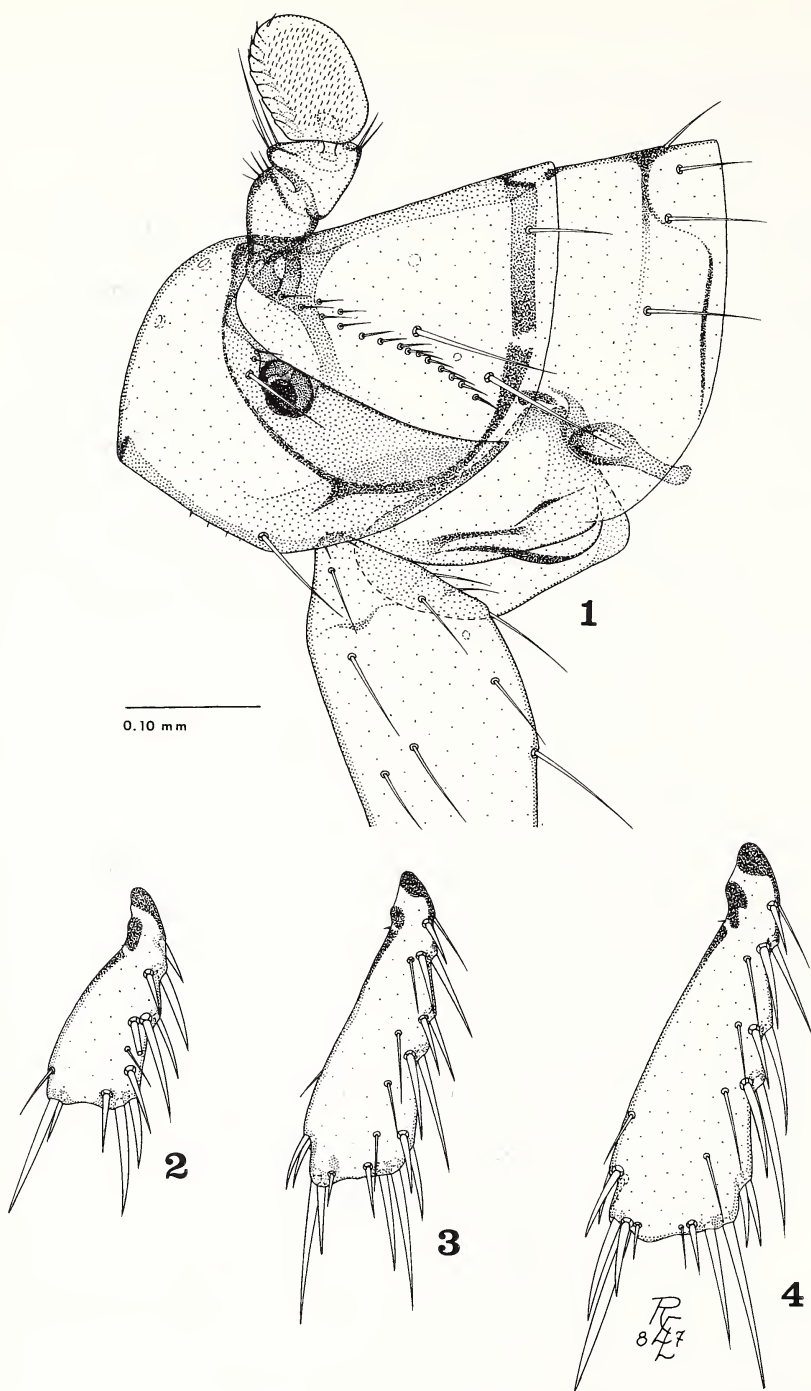
During a recent comparative study of the sexual apparatus in the males of the pulicoid genera by one of us (TBC), large numbers of specimens were borrowed from various persons and institutions. Among the specimens received from the British Museum (Natural History) was a single male collected in the Ngorongoro Center, Tanzania, by the late C. A. Hubbard. Although identified as *Xenopsylla raybouldi* Hubbard, 1963, it was immediately obvious that it was not this species and probably did not belong to this genus. Accordingly it was labeled genus X in the dissertation (Cheetham, 1987) in the expectation that it would subsequently be described as a new taxon. On the basis of phallic characters the specimen belongs to the *Xenopsyllini*, but is nearer to *Pariodontis* and *Procaviopsylla* than to other genera belonging in this tribe. Although it does not fit in any genus where males are known, comparison with the generic diagnosis of *Pulicella* Smit, 1964, in which the male is unknown, strongly suggests that it may be an undescribed species belonging to this genus. However, there is some variance in characters between those described by Smit and those found in the specimen under discussion. Following are the main attributes shared by both specimens: a) frontal tubercle absent; b) trabecula centralis present; c) midcoxa with complete sulcus; d) lowest abdominal tergal leucodiscs located obliquely above and in front of the spiracle; e) spiracular fossa of tergites II–VII oval, not circular; f) spiracular fossa of tergite VIII sickle-shaped; g) all fifth tarsal segments with 4 pairs of evenly spaced lateral plantar setae.

The genus *Pulicella* was erected for a single specimen collected in the Misuku Hills (ca. 33°30'E, 09°40'S) in northern Malawi, from *Rattus delectorum*. The generic diagnosis is thus based on some characters that may vary with sex. Accordingly, our specimen is described as a new species of *Pulicella*, although there are indications that it may constitute a new genus in the *Xenopsyllini*.

***Pulicella aenigma*, new species**

Figs. 1–7

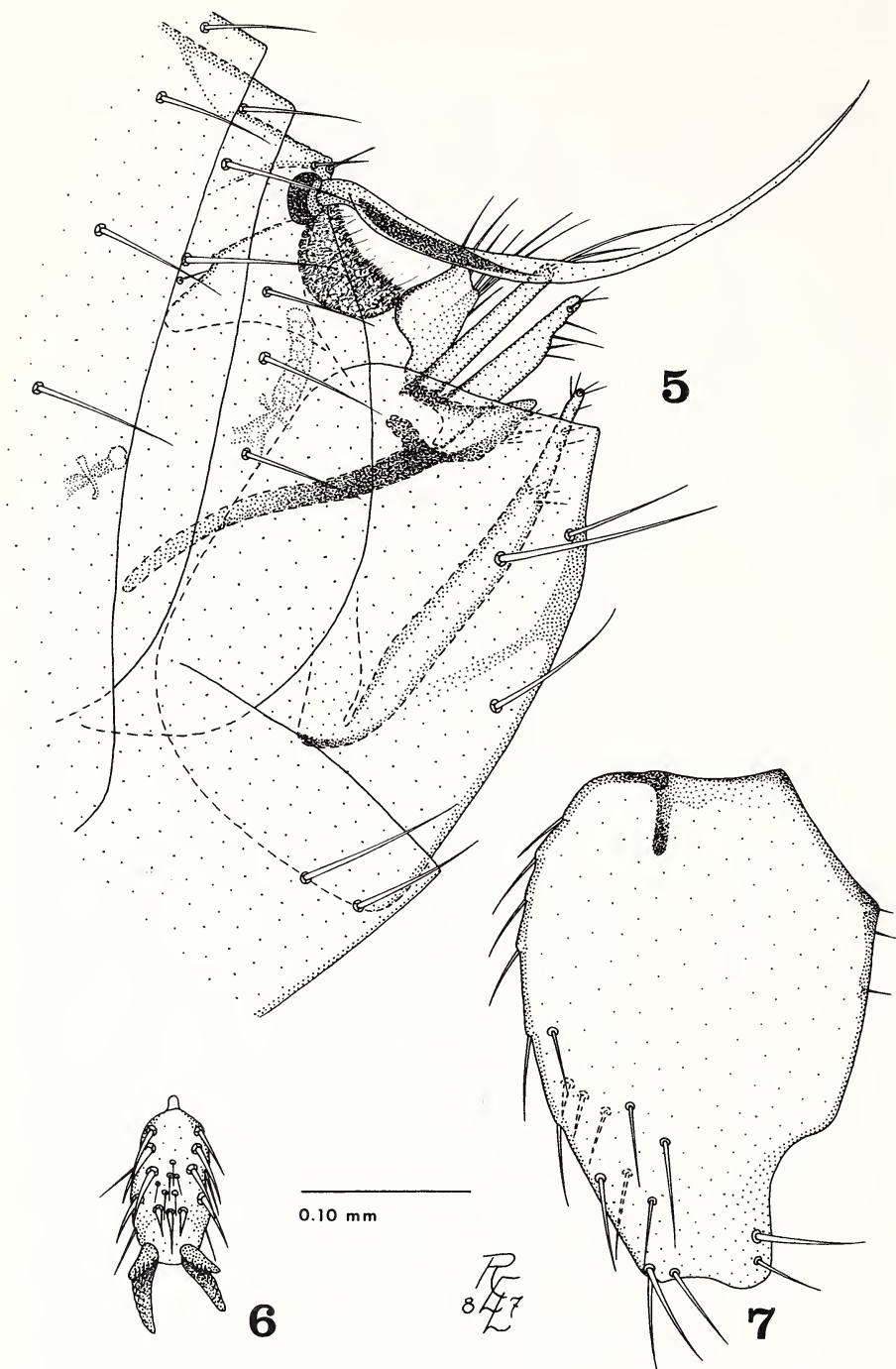
Diagnosis. Similar to the genera *Pariodontis* and *Procaviopsylla* in the anatomy of the genitalia. Differing from the former in lacking the acute genal lobe, the false comb on the hind coxa, and stout bristles on the thorax and abdomen. From the latter, it differs in lacking the pyriform hind coxa and its apical false comb. In addition, the antennal clava in *Procaviopsylla* species is conspicuously segmented throughout its



Figs. 1-4. *Pulicella aenigma* holotype male. 1. Head and prothorax. 2. Foretibia. 3. Midtibia. 4. Hindtibia.

length, whereas segmentation is only barely visible along the dorsal margin in this taxon. It differs from the only known specimen of *Pulicella*, a female, in the following characters: a) ventral margin of gena lacking pronounced lobe; b) trabecula centralis smaller than eye; c) eye well developed and with a trace of an internal sinus (left eye cracked); d) second midtarsal segment longer than first; e) tibial chaetotaxy dissimilar; f) 3 preapical plantar setae, not 2; g) much smaller, lighter, and less setose.

Description. Head (Fig. 1). Preantennal portion of head blunt, lacking frontal tubercle and conspicuous lobe on ventral margin. Ocular seta situated in front of well-developed eye. With a single seta on genal margin. Trabecula centralis circular, smaller than eyes and situated between them. Antennae as illustrated, with clava showing only slight evidence of segmentation along dorsal margin. Antennal fossa deep, enclosed ventrally by genal process and bordered dorsally by a row of 15 fine bristles, above which is 1 minute and 1 long bristle. Occipital row consisting of 1 long ventral seta and 2 much smaller setae dorsally per side. Labial palpi 5-segmented, extending to apex of forecoxa, or perhaps to middle of trochanter. Thorax. Pronotum and metanotum of equal length, mesonotum about $1\frac{1}{2}$ times as long as pronotum. Pronotum with 4–5 long setae per side. Mesonotum with 4 long setae per side and 1 long seta per side on mesepimeron. Metanotum with 4 long setae per side, metepisternum with 3 long bristles, and metepimeron with 4 long bristles arranged in a curved row. Legs. Forecoxa as shown in Figure 1, sparsely clad with long setae. Forefemur with 4–5 fine, submarginal setae on outer surface. Foretibia as in Figure 2. Foretarsal segments 1 through 4 only slightly subequal, almost moniliform. Foretarsal segment 5 with 4 pairs of lateral plantar bristles with pair number 3 slightly shifted onto plantar surface, with 1 long and 2 short preapical plantar bristles and 5–6 minute plantar setae as shown in Figure 6. Midcoxa with a complete oblique sulcus and lacking setae on inner surface. Midfemur with a few fine setae on inner surface. Midtibia as shown in Figure 3. Midtarsal segments 1 and 3 of approximately equal length, segment 2 almost $1\frac{1}{2} \times$ as long as adjacent segments, segment 4 hardly longer than wide, segment 5 as described for foretarsus. Hindcoxa somewhat intermediate between *Procaviopsylla* and *Xenopsylla*, lacking apical false comb and with 2 subspiniform bristles on inner surface near anterior margin as illustrated in Figure 7. Hindfemur with 5–6 fine setae arranged in a row on inner surface and 2 subapical, submarginal bristles on outer surface. Hindtibia as shown in Figure 4. Hind tarsal segment 4 about as long as wide, segment 3 about twice as long as 4, 2 about twice as long as 3, and 1 about twice as long as 2. Hind tarsal segment 5 as described for foretarsus. Abdomen. Tergite I with an anterior row of 6, a median row of 4, and a posterior row of 6 long setae. Spiracular fossa ovate-cordiform. Tergites II–VI with 4 or 5 bristles per side arranged in a single row. Tergum VII with 9 long bristles; 3 longer bristles each side and 3 shorter dorsal bristles that arise near the margin, between the 2 antepygial bristles. The latter, 1 per side, arise on a marginal pedestal and are flattened and contorted as shown in Figure 5. Lowest tergal leucodiscs situated obliquely dorso-cephalad of the spiracular fossa on segments III–VII. Spiracular fossa of tergum VIII sickle-shaped. Sternites III–VII with 2 long setae per side. Sternum VIII with 3 long setae per side. Periphalllic Structures. Apodeme of tergum IX elongate, triangular in lateral view. Manubrium long, thin and rod-like, not broadly fused with apodeme. P1 and P2 slightly subequal in length, with P1 more than 5.5 times as long as broad. P2 slightly broader than P1, with a short apodeme. P3 triangular,



Figs. 5-7. *Pulicella aenigma* holotype male. 5. Modified abdominal segments. 6. Foretarsus. 7. Hindcoxa.

large, broadly fused with base of manubrium and bearing a single, tooth-like lateral projection and a fringe of 5 fine setae along caudal margin. Distal arm of sternum IX long, broad basally, tapering distally. Phallosome. Aedeagal apodeme 10 times as long as broad, 3 times as long as aedeagus, constricted basally, smoothly tapering and upturned apically, terminating in a filiform projection. Ventral margin of median lamina strong, lateral laminae hyaline. Penis rods curving 360 degrees over apodeme. Apodemal rod well developed. Lateral fulcral lobes evidently fused with lateral laminae; thin and broadly curved. Median dorsal lobe with strong, curved dorsal margin. Suspensory sclerites absent. Inner tube large, expanded proximally with a dorsal dome; strong walls over proximal $\frac{2}{3}$; proximal projections prominent, smoothly tapering overall. Vesicle large, with strong margins. Ribs developing laterally into small pads lying dorsad of lateral fulcral lobes. Sheath tapered distally and pointed at dorsal apex. Lateral lobes indistinct, with wings not clearly discernible and accessory lobes seemingly absent.

Etymology. The specific epithet is Latin for something difficult to understand or explain and alludes to the fact that only this single specimen has been collected from one of the prime scenic attractions in eastern Africa.

Holotype. Male from Ngorongoro Crater floor, 5,000 ft (1,524 m), Tanzania, from *Otomys angoniensis*, 20.I.1963, leg. C. A. Hubbard. Returned to the British Museum (Natural History) collection of fleas at London, England.

Remarks. That the genus was erected with a female as holotype allows for speculation as to how many of the characters by which this taxon differs from *Pulicella macrotheca* are of a sexual nature. Smit (1964) gives 3.5 mm as the overall length of *P. macrotheca*. The overall length of *P. aenigma* is 1.4 mm. Such measurements are usually viewed as relatively inconsequential because the degree of abdominal expansion or contraction may vary considerably, depending upon how the specimen was processed before study. It is also recognized that male fleas tend to be smaller than the females, sometimes spectacularly so. Further, in long series of fleas, it is not uncommon for the measurements of the smallest female to overlap those of the largest male. The inescapable conclusion is that size is not a valid taxonomic character in this group.

Smit (1964) also remarks on the heavy pigmentation of his specimen, stating that, after 5 days in 10% KOH, his specimen was still very dark. Such is certainly not the case with our male. Again, pigmentation is not a taxonomic character of much value in fleas, but seldom is there great variation among the species belonging to the same genus.

Of perhaps more immediate importance is a consideration of the differences between this specimen, as set down in the diagnosis, and *P. macrotheca*, as described by Smit (1964). First, although there is no pronounced lobe on the ventral margin of the gena in the male, there is an incipient lobe present that may be somewhat deemphasized because of the totally different configuration of the head.

With respect to the trabecula centralis, there seems to be some confusion surrounding the applications of this term. The glossary to volume V of Hopkins and Rothschild (1971) lists three other names for this structure, all of which are treated as synonyms of each other. These are "area communis," "central tuber," and "tuber centralis." The latter two are obviously English and Latin versions of the same thing. By strict definition all four of these terms refer to the "... pale ovoid area where the

walls of the antennal fossae of the two sides are fused together to form an incipient central tuber . . ." (Hopkins and Rothschild, 1971). This definition is misleading in a number of ways. As often as not, the area communis, which seems to be the preferred term, is circular and dark, not pale and ovoid. That it forms an "incipient central tuber" is redundant because the latter is a synonym of the former. The matter is further confused by Smit's statement that a trabecula centralis is a diagnostic character for *Pulicella* and that ". . . of all genera of Pulicidae . . . this trabecula is only present in *Pariodontis*, while *Procaviopsylla* and *Xenopsylla* have an area communis." Smit's figure 6 shows this as a darkened area behind and slightly below the eye, which he indicates is small and globular and lacking an internal sinus. In our male, the area communis is circular, dark in color, and situated in the area between the well developed, ovoid eyes. Its position is certainly dictated by the configuration of the head and the trough-like antennal fossae.

The differences in leg segment proportions and chaetotaxy are difficult to explain. Although legs in the order vary from group to group, from deciduous in some tungids to massive in malacopsyllids, their development and chaetotaxy tend to be quite similar between the sexes in all the genera with which we are familiar.

These considerations aside, it is evident that the solution to the questions aroused by the discovery of this species must await further collections from central and eastern Africa.

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